Report:

Project Oversight Board review of the HEX project

Review held at Brookhaven National Laboratory October 19 and 20, 2017

Final Report Date: October 31, 2017

Executive Summary

A review of the HEX facility project took place on October 19 and 20 2017 at Brookhaven National Laboratory. R. Tribble, the Deputy Director for Science and Technology at BNL, requested the review. The objective of the review was to evaluate the status of the HEX project that received first funding in September of this year. This review gives an early assessment of the HEX project and provides important recommendations early in the project lifecycle.

The review panel in general noted that the technical scope is well defined for a project in its early phase. Many of the costs are well defined, and supporting documentation is available. With a few exceptions the project has a good starting estimate for the project cost. The management has in place a risk evaluation program that is being exercised. The committee felt that the highest risks to the project are related to the procurement of the superconducting wiggler (SCW) through a Russian vendor and the cost of the external experimental building. These risks are recognized by the project, which is working on mitigation strategies. This committee supports the project's plan to focus on reducing these risks.

Technical Systems

The technical systems are well defined for the phase of the project. The committee supports the project's proposal to develop the full scope of the HEX facility to a level necessary to define the interfaces to the equipment required for the HEX project. As an example the hutch designs, which are in the HEX scope, require a conceptual knowledge of the equipment that will be available in the future. It was noted that there are cases where R&D is ongoing outside the HEX project. The HEX project should formally monitor these efforts to ensure that any information needed to define the HEX interfaces to future upgrades will be provided to HEX when required.

ES&H & QA

The project presented existing programs and policies that will apply to HEX beam line. These ES&H and QA policies are sufficiently mature. The major programs and policies have been implemented for other NSLS-II beam lines and are well documented (e.g., SAD, ASE, USI process, safety reviews, configuration management, procedures management, procurement process). A list of potential HEX beamline hazards appears to have been sufficiently drawn up.

Cost and Schedule

The review committee felt that the cost and schedule were well developed given the phase of the project. However, it should be noted that a large effort will be required to bring the project cost and schedule to an adequate level for the May 2018 Preliminary Design Review (PDR). The project is on track but management should monitor the progress to ensure everything is progressing as needed. The HEX project will not be managed to a fixed scope so the usual interpretation of project contingency does not

apply. HEX defines accounts for essentially all the available funds leaving almost no cost contingency within the current scope. Given that there are large uncertainties in both the external building and the SCW cost, it is premature to de-scope the project now. In parallel to refining the cost estimates for these high cost items, the HEX management needs to develop the strategy for adding and subtracting scope as the costs are refined in order to ensure that there is always a high confidence in completing the baseline scope.

Management

The review committee felt that the HEX management structure was well defined and sufficient to oversee the project. However the committee did feel that some clarification of the reporting structure from the project to BNL management is in order. The present committee focused on the project risks and proposed mitigation plans. The risk identification program requires each manager to identify and define and quantify the risks related to their WBS. This process is effective in identifying the project risks. The project should go further in developing detailed mitigation strategies for the largest risks.

Key Recommendations

A. Track design and simulation efforts related to out-of-scope items, such as mirrors, if the delivered base scope design depends on them. This should be in place before the PDR.

B. Ensure that the SCW working group evaluates alternatives for the SCW acquisition. Hold an external review of the work of the SCW Task Force, significantly before the PDR.

C. Develop the plans for SCW procurement, including multiple scenarios, to understand the risk and potential cost and schedule impact, for presentation at the next Cost and Schedule review.

D. Obtain a current cost estimate for the satellite building prior to the PDR.

Table of Contents

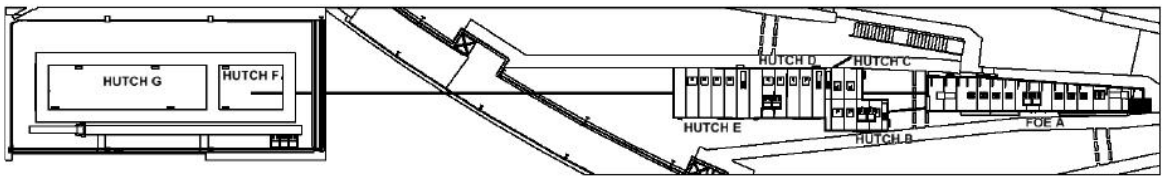
1 Introduction

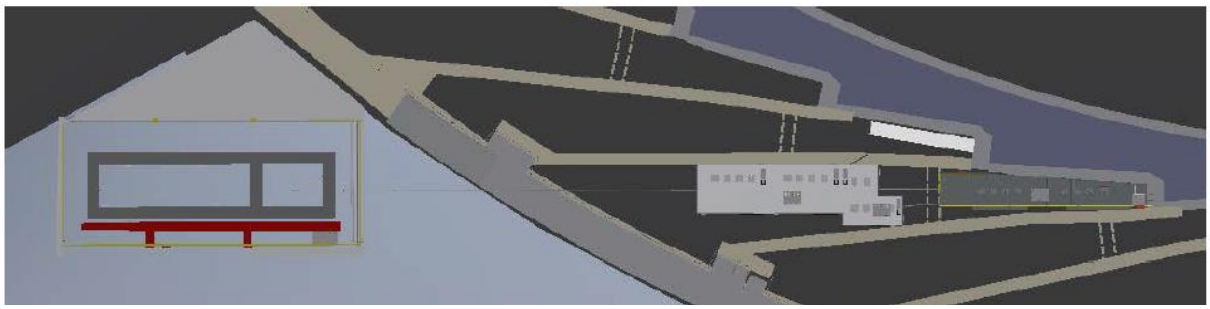
The High Energy X-Ray Scattering Facility (HEX) project will add critical new capabilities to the NSLS-II program at Brookhaven National Laboratory (BNL). The heart of the HEX facility is a superconducting wiggler (SCW) that is inserted in the NSLS-II beam. The wiggler generates a broad-band hard X-Ray beam that is perfectly suited to study dense systems like batteries. The projected intensity of the beam is sufficient to image components under operating conditions like charging and discharging in the case of batteries. Recognizing the importance of such a facility to the future of energy research the New York State Energy Research and Development Authority (NYSERDA) has contracted with BNL for the construction of the core HEX infrastructure. Brookhaven will also contribute directly to the management of the HEX project to insure its success.

The HEX project had just begun at the time of this review having received first funding only one month earlier. The goal of this review was to evaluate the status of the project at its beginning and provide feedback on the project's planning during its early stages. The review committee was specifically requested to evaluate the HEX WBS structure, the project risks, and the project cost and schedule.

The Review Committee was charged by B. Tribble to review the HEX project and the official charge can be found in Appendix 1. The composition of the of the committee is listed in Appendix 2 and the agenda of the review is shown in Appendix 3.

Figure 1: Overview of the HEX beamline showing the different experimental hutches. The first hutch contains the front-end optics, the intermediate experimental hutches are primarily for the future program, and the external building which house hutch F and G will house the EDXRD experimental station that is the core of the HEX experimental program.





2 Technical Systems (WBS)

Charge Questions:

Does the Work Breakdown Structure (WBS) adequately cover the scope of the project?

Yes.

Are all elements of the WBS clearly defined?

Yes. Improvements are recommended, for improved value throughout project execution.

Are the scope and technical requirements of each WBS appropriately addressed?

Yes. See Findings / Comments / Recommendations.

2.1 – Findings

Scope is defined by WBS dictionary, supplemented by detail and context provided in the P6 schedule and L3 summary tables shown in PM presentation. WBS lowest level appears to be L4.

2.2 – Comments

Drawing correspondences between certain WBS descriptions and numbers with the associated cost estimates and other project data is challenging.

2.3 – Recommendations

1. Consider maintaining the project description in a table of WBS dictionary entries, alongside other key project data, for reference throughout the project execution. Corresponding data would be: WBS number (to the lowest level), descriptions, costs, funding source, control account, procurement number (APP and PO, as applicable), identification of division of labor and material. This should be complete by the PDR review.
2. Non-relevant text and WBS dictionary entries should be removed.

3 Technical Systems (General)

3.1 – Findings

Technical scope is robust. Funded (base) scope is identified.

Beamline technical description (CDR) contains some information about conceptual radiation shielding design, that was not captured in presentations.

Limited information was provided about certain out-of-scope items. Some out-of-scope items have impact on designs of affordances for future branch buildouts or even the central branch in the base scope (e.g. out-of-scope mirror characteristics can affect designs and locations of in-scope affordances such as hutches as well as beam pipe trajectories).

The sizes of the hutches were selected to match existing designs. The project team feels these dimensions are more than ample to meet the needs of most experiments. However no formal requirement is defined.

Design effort supporting PDS and endstation are staggered by roughly 1 year, which appears to provide the benefit of flat resource requirements (e.g. design/engineering resources move on to endstation after finishing PDS).

Resource-level uncertainty and basis of estimate data are incomplete.

No software drivers for beamline component controls are included in the present estimate.

3.2 – Comments

A short list of top-value items (e.g. PDS, for the beamline), i.e. APPs, would be useful to include in a slide in presentations for management and review.

Discussion with the project staff during the coffee break revealed that some design and simulation effort related to out-of-scope items such as mirrors is being addressed outside of the base project scope, via NSLS-II diffraction program funds. Progress on such effort is important to monitor by the project because the delivered base scope design (e.g. affordances for future branches) depends on it.

Presentations for HEX Project reviews should limit references to out-of-scope items, while drawing connections with them if needed (e.g. impact of out-of-scope future optical elements or endstations on the base scope designs of the central beamline and the affordances for future branches).

A brief motivation for the hutch dimensions in the CDR will be helpful to include in future reviews.

3.3 – Recommendations

3. Include a slide showing top-value items in future project review presentations.
4. Conceptual description of shielding should be included in the beamline presentation in future conceptual design reviews.
5. Track design and simulation efforts related to certain out-of-scope items, such as mirrors, that are being addressed outside of the base project scope, if the delivered base scope design depends on them. This should be in place before the PDR review.

4. ESH & QA

Charge Questions:

Are the ES&H aspects being properly addressed?

Yes. Hazards and controls identified for HEX beam line (not the experiments); costs identified for shielding calculations, shielding, PPS, SCW pressure vessel and cryogenics, SCW magnetic field, white beam heating, construction. Safety review, NEPA and readiness review processes defined.

The following sections are the assessments of the Technical and Safety Subcommittee against the specific ES&H charge question. Findings, Comments and Recommendations are also included.

4.1 – Findings

The project presented existing NSLS II ESH and QA programs and policies that will apply to the proposed HEX beam line. These ES&H and QA programs and policies are based on experiences gained from prior beamline construction. The major programs and policies have been implemented for other NSLS II beam lines and are well documented (e.g., SAD, ASE, USI process, configuration management of documents and equipment, procurement process). A list of potential beamline hazards appears to have been drawn up, Experimental hazards and controls were not covered in the safety presentations but may impact the satellite building design. For example, in-operando battery research hazards as mentioned in one of the initial presentations.

Potential hazards in the exterior space around beamline will exist between experimental building and the new satellite building. This exterior area will need to be controlled with a locked fence and have a shielded vacuum-pipe or equivalent controls.

Authorizing operations with beam based on conducting an Instrument Readiness Review has been delegated to NSLS-II by the DOE Site Office for other new NSLS II beamlines. However, white beam has higher energy and the concrete wall thickness for the new satellite building external to the experimental building suggests ionizing radiation may exist in areas external to the building.

For protection against electron beam damage, the SCW may have to be kept cold during NSLS II operations. For protection of the NSLS II storage ring from a pressure boundary break at the SCW, the SCW pressure vessel will need either an equivalence ruling from the BNL Authority Having Jurisdiction or

an ASME stamp, and will require pressure relief devices. Excessive noise, startle hazards, potential ODH in the area proximate to SCW, projectiles, etc. are possible during a pressure boundary failure.

The satellite building construction will be subcontracted by F&O's MPO. They indicate their biggest challenge is tying into an existing building while maintaining temperature control in an experimental floor area with a 30-foot-wide opening in the building. Access control to the construction from the experimental floor is a concern that was not specifically addressed in the presentation.

The satellite building shielding requirements appears in sketches. Since building construction will be via a subcontractor to F&O's MPO, obtaining official as-built shield drawings will be a challenge.

A NEPA assessment and ruling letter was found but the BNL Environmental Evaluation Notification Form was not used. Instead the assessment ruling was based on the NSLS II Environmental Assessment and documented in a memo by BNL's Assistant Attorney to File.

4.2 – Comments

In-operando large battery research (e.g., Tesla battery) may involve fires, explosions, hazardous gas release, and could require a special enclosure or a special ventilation system for the satellite building.

Low level radiation might be possible in exterior space. This may require special posting and/or routine radiation surveys. Protection of the exterior beam line itself is necessary to prevent it from being moved or struck by a vehicle.

Some things about HEX are different from other beam lines; e.g., white beam will be transported exterior to the experimental building. Radiation faults will require calculations for credible loss events exterior to the satellite building and near the associated transfer line, and fault studies will be needed to verify the shielding effectiveness. Shine into routinely occupied areas from the satellite building should be considered. Possible use of area radiation monitoring may be a consideration.

Electron beam loss can damage to the SCW; and a cold SCW failure could allow rapidly expanding liquid helium into the NSLS II Storage Ring vacuum pipe. Both these scenarios may impact operations and delay the missions of NSLS II.

ASME requirements apply to the SCW pressure vessel. Based on low demand for such a device, it is not likely the maker will obtain an ASME stamp for the pressure vessel. Thus, the BNL AHJ (Authority Having Jurisdiction) can apply an equivalence ruling in this case.

Controlling User access to the future construction area and construction's area's impact on the experimental environment needs to be worked out to maintain smooth NSLS II operations. Digging and other vibration producing activities may disturb the electron beam and the NSLS II Storage Ring may have to shut down during satellite building foundation work.

As-built drawings for shielding, PPS and the SCW are required to pass the IRR. The NSLS-II is in effect a third party to handling some of these drawings and will need a process to capture and maintain them.

Environmental authorization documents and their basis documents are required to pass the IRR. Environmental laws may change in the future and a clear path to these original authorizations is needed.

The Technical and Safety Subcommittee's response to the ES&H Charge Question is as follows:

Are the ES&H aspects being properly addressed?

Yes. Hazards and controls are identified for HEX beam line but not for future experiments. Provisions in the satellite building design could be made for future experiments such that it could allow for easy modification if ventilation, fire protection and/or containment are required. Costs were identified with sufficient margin for protection from non-standard industrial hazards. Items considered include shielding calculations, shielding, PPS, and pressure vessel code compliance. Conventional safety issues such as cryogenics, magnetic field, white beam heating, and facility construction have been considered. Safety review processes are defined for NSLS II, the NEPA process was followed, and an established readiness review process for new beamlines exists.

4.3 – Recommendations

6. The process for experimental hazard review should be briefly addressed in presentations in the future. The potential for additional hazards and controls in the satellite building should be acknowledged.
7. The area where the HEX beam line is external to buildings should be shown as a fenced or otherwise restricted area on the final drawings.
8. Obtain concurrence that the Site-Office-delegated NSLS-II-authorization-to-operate newly constructed beamlines also applies to HEX. This must be verified prior to the IRR.
9. Describe responsibilities and plans regarding the controls which protect the SCW from the electron beam in the Storage Ring and controls which protect the Storage Ring from SCW pressure boundary failure. This should be established prior to the PDR.
10. Obtain an equivalence ruling from BNL Pressure and Cryogenics Safety Subcommittee (PCSS) for the SCW pressure vessel, if an SCW is to be procured. Documentation requirements for equivalence ruling are defined in SBMS. A design review for safety is required prior to procuring or fabricating the SCW.
11. A User training program addition needs to be developed and implemented that addresses the added hazards and controls related to the future HEX construction area. This must be completed prior to construction start.
12. Describe the configuration management system for drawings (e.g. shielding, SCW and PPS) in future presentations.

13. All NEPA documentation and their basis documents related to HEX should be archived and under NSLS II configuration management. This should be done before the PDR.

5 Management

Charge Questions:

Has there been a satisfactory evaluation of the project risks?

Yes, for the most part. The risks have been reasonably well identified for this stage of the project. A process is in place where each manager identifies risks, which are then evaluated by the team. A notable risk of uncertain evaluation is the NYSERDA "financial contingency" through which $15M may not be available. The project is justified in treating this "Residual Greenhouse Gas Initiative" (RGGI) risk as a special case.

Are the risks and mitigation plans adequately documented?

No. The mitigation plans are partially documented in the CDR. Several additional options for mitigating the highest risks were presented at the review, but are not fully documented.

5.1 - Findings

HEX is a NYSERDA project ($25M) with a BNL component ($5M). Hence the usual DOE 413.3 structures do not necessarily apply. Nonetheless the project has elected to adopt the spirit and many of the elements of the familiar DOE process, taking some elements of PMBOK, and adding some uniquely BNL parts (e.g. safety and interfaces).

The legal contract between BNL and NYSERDA defines many of the fundamental structures, for example 3 critical go/no-go milestones, 15 "technical work scope tasks" which are also milestone deliverables, and a funding profile. The Key Performance Parameters in the contract are non-quantitative, except for the need to deliver a Superconducting Wiggler source capable of delivering 150 keV photons, and 3,000 gross square feet of building.

The 3 critical go/no-go decisions defined in the contract within the 5 year schedule are:

1. Apr-18 Preliminary Design Review held
2. Aug-18 SCW procure/make decision
3. May-19 Final design review held

NYSERDA decides on the achievement (or not) of the go/no-go deliverables. These 3 deliverables are relatively simple, with schedule contingency included that should make them relatively straightforward to achieve.

The contract states that "… $15 million in RGGI [Regional Greenhouse Gas Initiative] proceeds will not be available unless the below financial contingency is met". This external risk, held by NYSERDA, is seen as relatively unlikely by the project. If NYSERDA funding is limited to $10M then NSLS-II/BNL and NYSERDA will discuss how to proceed, to make best use of the spent funds. A plan for proceeding in the event the second $15M was not presented and is unavailable.

Project Director Broadbent is also Partner Portfolio Manager for the suite of partner beamlines. HEX is the only such project that will be active after Jan-18. The Beamline Advisory Team (BAT) offers independent external evaluation, advice and recommendations to Project Director Broadbent. The HEX Oversight Board is under construction, chaired or co-chaired by Misewich, including institutional participation from NYSERDA.

There is very little contingency. Mitigation to risks is largely taken out in technical scope. Scope could be added if the contingency analysis indicates that completion would be reasonably safe, or removed if the estimate to complete exceeds the available funds. The HEX project is a build-to-cost project insofar as a maximal impact scope will be provided for a fixed cost.

The cost estimate for the satellite building is quite old and the new design effort is just starting. Updated information will be available well before the Preliminary Design Review in Apr-18.

The project raised a concern about the availability of people with critical skill sets – a concern that had a significant impact on previous NSLS-II beamline projects.

The beamline infrastructure for potential future upgrades is included in the project scope.

Superconducting wiggler

SCW procurement is clearly identified as the largest risk. Ideally the project would buy the SCW from the Budker Institute in Russia, who have the unique experience of manufacturing about 10 of these devices. However, there are political ramifications from pursuing a Budker purchase, as a result of the current need to purchase through BNL. If it were possible for another non-DOE institute to make the purchase there would be no issue.

One proposed mitigation for the SCW procurement is to borrow an existing permanent magnet wiggler from Australia, which would deliver a weaker spectrum and will impact the program. The Aug-18 milestone deliverable "SCW procure/make decision", which is also go/no-go decision number 2, defines when the SCW procurement strategy must be final.

A technical SCW Task Force headed by Tanabe, including members from the BNL Superconducting Magnet Division, is developing and discussing alternatives, which themselves are not without risk. The cost of fabricating an SCW at BNL is not yet known.

5.2 - Comments

We recognize and support the efforts of the project in tailoring the complexity of the usual set of DOE 413.3 documents into what is actually needed and useful for this project. Clear guidance from BNL related to non-413.3 projects would aid in understanding the review and approval process for non-DOE projects. Ultimately the contract between BNL and NYSERDA takes precedence over the Project Management Plan, if and when ambiguities or minor inconsistencies between the two become important.

The approval process for the Project Management Plan and other documents is not clear. The link between the QA process and attainment of key project milestones (IRR, BORE) is not clear. Understanding the QA deliverables for each critical review must be made clear.

Tailoring the CDR and the presentations to focus on components in the HEX scope would have helped the reviewers. The project is correctly designing the out-of-scope elements to a preliminary design level that will ensure the interfaces are well defined, because these interfaces are critical to enabling future HEX upgrades.

The project should consider the mechanisms by which an oversight structure receives independent external technical advice and review, in parallel to the advice offered by this POB panel. It seems inadvisable to include a NYSERDA member or a DOE member on the Integrated Project Team, which "guides and manages executive level project decisions". It might be wise to interpret the IPT as a monthly status reporting group (for example in the Project Management Plan).

A simple plan that summarizes funds available and a proposed new scope should be developed, ready for use as the starting point of a negotiation with NYSERDA, if it is determined that the additional $15M is not available.

The HEX project should seek advice from the SCW taskforce group on planning for commercial procurement (including technical and safety considerations for integration to the accelerator), as well as on development and costing for feasible alternatives. The SCW delay risk estimate is low, at an estimated impact of only $25k. This estimate should be cross-checked. The mitigation plan related to the procurement for the SCW through Budker is not very will developed. It was unclear how piecemeal ordering of wiggler components would solve the procurement issues. Although Budker is said to be seeking a partner or subsidiary in the U.S., this also may not solve the procurement issues of an SCW that is wholly fabricated in Russia.

The cost estimates for the satellite building are based on extrapolations and not actual estimates for the building planned. The new satellite building design process needs to estimate the impact of HEX on the running facility. Constraints, if they exist, need to be considered as the schedule is refined.

Labor hours are split between many people, each with a small fractional time commitment. This can cause delays if experts are not available when needed. It is desirable to plan for fewer people, each with larger fractions of their time.

The visit of NYSERDA Project Manager Bourgeois to BNL on October 30 is an opportunity to resolve many of the ambiguous issues.

5.3 - Recommendations

14. Work with BNL management to clarify the depth and frequency of future POB Panel reviews, before the end of CY 2017.

15. Work with BNL management to decide how POB Panels report to an oversight structure, before the end of CY 2017.

16. Work with BNL management to consider constructing a Technical Panel that reports to an oversight structure at least annually, before the Preliminary Design Review scheduled for April 2018.

17. Construct a clearer organization chart to present at the next POB review.

18. Define a review process for establishing modified scope, and present at the next POB review.

19. Re-evaluate the risk of availability of specialized labor and develop a mitigation plan, before the next POB review.

20. Ensure that the SCW working group evaluates the alternatives for the SCW acquisition. Hold an external review of the work of the SCW Task Force, significantly before the Preliminary Design Review in April 2018.

21. Develop the plans for SCW procurement, including multiple scenarios, to understand the risk and potential cost and schedule impact, for presentation at the next POB review.

6 Cost

Charge Questions:

Are the cost estimates credible and realistic for this stage of the project?

Yes Management and Project Controls spent a great deal of time to ensure that the cost estimates for the most part are credible and realistic. Our review showed that to be true although there were instances, specifically with regards to the Satellite Building where there is more work to be done. This has been acknowledged by Management.

Does the cost estimate include adequate contingency?

Maybe. There is minimal cost contingency. $1.8M of items are listed as potential items that could be “de-scoped”. It appeared that some of the additional cost contingencies are built into various WBS lines as “extra”. Management may want to consider reviewing these extra items to ensure they are comfortable this total amount is consistent with their risk analysis. More information on the SCW and the building will be needed to evaluate this.

Is the basis of estimate clearly documented and complete?

The basis of estimate is clearly documented but preliminary. Substantial improvements will be required prior to PDR.

The BOE is formally spelled out in the Project Assumptions document and appears sound. It is mentioned in the Project Assumptions that these cost estimates are included in the Cost Estimating Book. However the CEB was not available at the time of the review. For the majority of the costs reviewed, these guidelines were followed with a few exceptions (see detailed findings)

Management recognizes that VAB is not factored into the current estimates. This should be done as soon as possible using the preliminary rates from the Budget Office

The following sections are the assessments of the Costs against the specific cost related charge questions and includes findings, comments and recommendations.

6.1 - Findings:

The cost estimates are credible and realistic for this stage of the project. Management and Project Controls spent a great deal of time to ensure that the cost estimates were documented accurately and consistently. The review did find several instances where the backup schedules do not agree to the HEX summary P6 schedule (7.5.4.2-3-4, 7.7.5.2). Also, there were instances where it would appear that the overhead burdens were not applied correctly (7.5.4).

The Basis of Estimate is formally spelled out in the Project Assumptions document and appears sound. It was mentioned in this document that these estimates are included in the CEB; however, the Cost Estimating Book was not available at the time of the review.

We also found that the estimate on the proposed Satellite Building was outdated and we could not determine how accurate the estimate was based on the information presented to us.

In terms of the question of adequate contingency, there are "extra" costs built into some of the estimates which denote some contingency built up but not consistently used or totaled. And, based on the documentation provided, it was unclear what the total contingency is and if this is consistent with the risk analysis performed already.

It was also noted that activities related to potential scope increases or future upgrades are in the existing P6 schedule.

6.2 - Comments:

With regards to WBS sections that were reviewed and cost/overhead inconsistencies found in the supporting documentation, Management reviewed these findings with us and explained that the documentation is a work in progress and will be corrected for the PDR (Spring 2018).

In review of the Satellite Building estimate, Management also agreed that the estimate is premature and needs to be updated to properly reflect the costs for this area.

In terms of the cost contingency, although we weren't provided how much is potentially included overall, having cost contingency helps prepare for overruns or costing errors. This project is early in the process and cost overruns or errors may not be apparent yet. We recommend building a cost contingency amount or factor but at the very least accumulate the "extra" amounts that are buried throughout the project so that the (contingency) question can be answered. It is not apparent how much "extra" is included in the estimate.

For potential scope increases or future upgrades, prior to baselining the project decision points should be added to the schedule defining when decisions must be made to add the various scope options or not. Some options will be eliminated early as the time for completion will be long or cost prohibitive.

6.3 - Recommendations:

22. It is important to provide supporting cost documentation that agrees to the P6 summary and if there are differences, it would be helpful to have explanations for any deviations. This should be completed before the PDR Baseline.
23. Seek out assistance from the Business Operations group or use history from previous projects to determine the correct category that high dollar value procurements belong in and what overhead rates to use to ensure proper estimates. This should be completed as soon as possible.
24. Obtain a current cost estimate for the Satellite building prior to the PDR (Spring 2018).
25. The bottom-up cost uncertainty and BOE assessment exercise should be completed and summarized. This should be done prior to PDR.

7 Schedule

Charge Questions:

Are the schedule estimates credible and realistic for this stage of the project?

Yes. The labor and material estimates are based on the CAM's scaling of similar work performed on other beamlines.

Does the schedule include adequate float?

Yes. For this stage of the project, it is shown the project currently has @ 4 months of schedule float however the schedule is constrained by the funding profile which artificially constrains the schedule logic.

Are there any cases of missing/insufficient documentation or irregularities in the cost estimates and/or schedule that should be addressed?

Yes. The Cost estimate for the HEX satellite building was based on the actual cost of a different but similar building. The costs were then scaled to attempt to correct for the different layouts.

The following sections are the assessments of the Cost and Schedule Committee against the specific cost and schedule related charge questions. Findings, Comments and Recommendations are also included.

7.1 Findings:

For this stage of the project the schedule is well defined with 179 activities in the current version of the HEX schedule. All the activities are logically ties utilizing predecessor/successor relationships. The schedule logic is constrained by the funding profile and therefore some activities delayed due to this funding constraint. The WBS is well defined and activity content follows what is defined in the WBS dictionary with documented milestone dates as outlined in the PMP matching those in the schedule.

The project has defined a good reporting procedure and has documented a format for monthly status utilizing the suite of established Project Management tools including Primavera Project Planner (P6) for schedule development, resource loading and status reporting by CAM's; Deltek Cobra for EVMS reporting (BCWS, BCWP, ACWP, EAC, BAC, Variances and Performance indices); CEB (Cost Estimating Book) for documentation of estimates; IPDv2 for posting monthly CPR, variance, labor budget and Expense reporting and Acumen Fuse for conducting Schedule diagnostics.

7.2 - Comments:

Most aspects and portions of the WBS have been well defined and addressed in the schedule as detailed activities or as future planning packages to be further detailed as the project is further defined.

Procurement of the SCW is the largest risk identified on this project. Discussions on some of the presentations centered building this item In-house. Should this become a viable option, the construction of the SCW should be detailed in a separate schedule for further analysis

It was discussed and agreed by the management team that the HEX Satellite building estimate will require further detailed analysis and should be estimated in detail once a viable design is defined.

7.3 - Recommendations:

26. Continue to detail out planning packages and refine schedule logic as the project information becomes more defined.
27. As design of the Satellite building becomes defined, subdivide the construction into standard subdivisions. This should be done prior to baselining.
28. Layout a preliminary schedule to build the SCW in house if this becomes a viable option as this should be done prior to the Go-noGo procurement strategy milestone.
29. Scope deletion / addition decision milestones should be included in the project schedule prior to baselining.

Appendix 1 Review Charge

Office of the Deputy Director for Science and Technology

BROOKHAVEN NATIONAL LABORATORY

Building 460
P.O. Box 5000
Upton, NY 11973-5000
Phone 631 344-3177
Fax 631 344-5803
rtribble@bnl.gov

managed by Brookhaven Science Associates
for the U.S. Department of Energy

Memo

Date: September 27, 2017

To:

From: Robert Tribble, Deputy Director for Science and Technology

Subject: High-Energy Engineering X-ray (HEX) Beamline Project

The High-Energy Engineering X-Ray (HEX) Beamline project was proposed in 2013 and will include a high energy x-ray (>50keV) required for penetrating batteries or other engineering samples and a satellite building that will be designed for handling large samples and difficult sample environments. The scope of the project will likely be adjusted based on the budget availability. The Project Team expects to get $25M of New York State funding with $3M received in September 2017 for the start of design and construction. To ensure that the project has been well planned for a conceptual design review at the end of October and the Preliminary Design Review planned for April 2018. Jim Misewich has requested that a Project Oversight Board (POB) Sub-Panel conduct a status review of the project.

I am asking for your assistance as a participant in this sub-panel review scheduled for October 19 and 20 with the charge as follows:

- Does the Work Breakdown Structure (WBS) adequately cover the scope of the project? Are all elements of the WBS clearly defined?
- Are the scope and technical requirements of each WBS are appropriately addressed?
- Are the project assumptions clearly stated? Are all necessary assumptions fully captured?
- Are the cost and schedule estimates credible and realistic for this stage of the project? Do these estimates include adequate contingency?
- Is the basis of estimate clearly documented and complete?
- Has there been a satisfactory evaluation of the project risks? Are the risks and mitigation plans adequately documented?
- Are there any cases of missing/insufficient documentation or irregularities in the cost estimates and/or schedule that should be addressed?
- Are the ES&H aspects being properly addressed?

Proposed membership on this sub-panel is:

- Jim Stewart (Chair), DUNE Project Manager
- Steve Peggs, C-BETA Project Director
- Lonny Berman, Project Manager
- Jeff Keister, Deputy Project Manager
- Pete Selgrad, Project Controls Administrator, PMC
- Kathleen Didie, Business Operations
- Ed Lessard, ES&H, C-AD

A final report should be prepared and submitted to me by Friday, October 31, 2017.

cc: J. Hill
E. Johnson
J. Misewich

Appendix 2 Committee Membership

Technical Systems

- Lonny Berman, Project Manager
- Jeff Keister, Deputy Project Manager

Safety

- Ed Lessard, ES&H, C-AD

Cost

- Kathleen Didie, Business Operations

Schedule

- Pete Selgrad Project Controls Administrator, PMC

Management

- Jim Stewart (Chair), BNL DUNE Manager
- Steve Peggs, BNL C-Beta Project Director

Appendix 3 Review Agenda

Thursday, October 19, 2017

08:00 - 08:40	Executive Session and Coffee	
08:40 - 09:00	Scientific Requirements	E. Dooryhee
09:00 - 09:30	Project Management	A. Broadbent
09:30 - 10:00	Beamline Overview	Z. Zhong
10:00 - 10:20	Beamline Infrastructure	A. Broadbent for C. Stebbins
10:20 - 10:40	Accelerator Infrastructure	G. Fries
10:40 - 11:00	*Coffee*	
11:00 - 11:15	Controls	Z. Yin
11:15 - 11:30	Satellite Building	B. McCaffrey
11:30 - 11:40	ES&H	L. Stiegler
11:40 - 11:50	QA	J. Zipper
11:50 - 12:10	Cost and Schedule Estimation	R. Gutta
12:10 - 13:00	*Lunch*	
13:00 - 16:00	Breakout Session #1 Management Cost Schedule - *Bldg 743, 156*	
13:00 - 16:00	Breakout Session #2 Technical and Safety - *Bldg 743, 177*	
16:00 - 16:40	Sub-Panel Executive Session	